A RAND NOTE

COST IMPLICATIONS OF TRANSFERRING STRATEGIC AIRLIFT C-141s TO THE AIR RESERVE FORCES

A. A. Barbour

February 1985

N-2252-AF

Prepared for

The United States Air Force

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The Military Airlift Command's (MAC) C-141 fleet presently is operated under an arrangement whereby each squadron is manned by both active duty and reserve personnel on an approximately 55% active to 45% reservist basis. This Note compares the cost of operating these C-141 squadrons under the present arrangement with the cost of a wholly reservist operation. It was found that when the costs of the present combined operation are calculated with the usual cost factors for C-141 squadrons there appears to be a potential to save one-third of the annual cost per squadron by transferring the C-141s to the Air Reserve Forces (ARF). However, the relatively high cost of the present C-141 operation, which stems largely from its high peacetime flying rate, would not be reduced by a transfer to the ARF. As a result, the potential savings of a transfer shrinks to 15%, and become negligible when the cost of providing peacetime airlift service by other means is added back in. The author emphasizes that when another cargo aircraft is acquired that can adopt the peacetime missions of the C-141s at comparable cost, these side-effects of the C-141 active/ARF comparison will disappear.

PREFACE

This Note compares the costs of operating C-141 strategic airlift squadrons under the present arrangement with those under Air Reserve Force "ownership." Unlike Rand's past cost analysis work in this area, the comparison is not between purely active-force and reserve squadrons; each of the present MAC/Associate squadrons already consists of a roughly 55-45 mixture of active and reserve personnel.

The study responds to a request for assistance from Headquarters, Military Airlift Command (XPP) early in 1984 to develop a means for making cost comparisons that takes into account the unique peacetime missions of the C-141 force--i.e., the maturing ("experiencing" or "aging") of new pilots and the provision of airlift service to the armed forces.

A draft of this Note was distributed to interested Air Force active and reserve offices for comment. Many of the suggestions that were received were incorporated into the text, and others led to revisions of tables and text to clarify the points being addressed. Any errors or misconceptions that remain are, of course, the responsibility of the author.

The Note was prepared as part of concept-development activities of the Project AIR FORCE Resource Management Program. It should prove useful to planners engaged in the study of Total Force Mix issues.

SUMMARY

This Note supports opposition to recent Congressional legislation directing the Air Force to transfer some of its strategic airlift C-141s from the Military Airlift Command to the Air Reserve Forces. The arguments reflect both operational and budgetary concerns. However, the objections will disappear when a replacement aircraft is acquired that can fulfill the peacetime responsibilities of the present C-141 fleet at similar cost.

This C-141 force mix study differs from previous Rand cost comparisons of active force and Air Reserve Force (ARF) squadrons in that **the present operation of the MAC fleet already is a half-and-half mixture of active duty and reservist personnel** (but with all of these first-line aircraft "owned" by MAC). Thus, the comparison is between the present combined MAC/Associate form of operation and an "Independent" ARF operation.

When the relative costs of these alternatives are calculated with the usual C-141 average cost and operational factors, the Independent ARF squadrons appear to cost about one-third less than their MAC/Associate counterparts.[1] **However, this cost comparison ignores the fact that more than half of the flying hours of active duty C-141 MAC squadrons is for experiencing (or maturing) copilots for the C-5 force, for the rated supplement, and for upper echelon positions that designate "rated officer" as a job prerequisite.** Because the cost of this additional flight training can largely be written off by the peacetime transportation cost savings it generates, C-141s traditionally have been a major provider of this pilot experiencing process.

When the costs of these additional flying hour requirements (which will not be reduced when a C-141 squadron is transferred to the ARF) are added back into the equation, the potential cost savings shrink to 15 percent.[2] Moreover, with each transfer the burden of experiencing

[1]This is based on the combined cost of two 9-PAA ARF squadrons. To the extent that the ARF could support full 18-PAA squadrons, the difference would increase to about 45 percent. The inclusion of retirement costs contributes about 1 percent to these cost differences.

[2]For an 18-PAA ARF squadron the reduction would be about 25 percent.

pilots for the "other" requirements would increase for the remaining MAC squadrons because of the decrease in the available aircraft and crew authorizations:

- The peacetime daily UTE rate would increase, leading to an increase in the proportion of more costly full-time mechanics
- The flying hours per crew would increase with possible repercussions on the retention rate of the MAC pilot inventory (depending upon factors for mission length and time away from home)
- The number of C-141 airframes available to meet DoD peacetime airlift requirements would decline, leading to the use of more expensive alternatives.

These unwelcome side effects of the loss of C-141s from the active MAC force would negate almost all of the remaining cost savings expected by the proponents of the C-141 transfers.

Any plans to shift additional C-141 assets from MAC to the ARF at this time should be reviewed in the light of these adverse effects. **It is recommended that any further C-141 transfers be delayed until another aircraft can be procured for MAC that is able to adopt the peacetime missions of the present C-141 force at comparable cost.**

ACKNOWLEDGMENTS

The author is indebted to the planning staff and others at Headquarters, Military Airlift Command for many of the basic ideas and much of the operational and costing data that underlie the cost analyses developed in this study. Additional thoughtful advice and criticism were provided by the staffs of the Air Force Reserve and the National Guard Bureau. At Rand, John Schank reviewed the Note and offered useful suggestions for updating the Reserve personnel figures and for clarifying the presentation.

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I. INTRODUCTION

GENERAL

In 1983, Congressional legislation directed MAC to transfer two squadrons of C-141s to the ARF immediately, altering MAC's long range plan to transfer C-141s to the Air Reserve Forces (ARF) after receipt of a replacement aircraft. MAC is not particularly concerned about the loss of one or two squadrons of C-141s, but this aircraft is the workhorse of MAC's strategic airlift fleet; it provides needed peacetime airlift services at a lower cost than is possible using available alternatives. MAC would prefer to postpone the transfer of any more C-141s to the ARF until delivery has begun on a replacement aircraft that can perform the C-141's functions at comparable cost.

The proponents of the above Congressional mandate seem unmindful of the fact that MAC's C-141s already are shared with the ARF. No appraisal seems to have been made of the partnership arrangement MAC has developed with the USAFR nor of the effect that the direct transfers to the ARF might have on the continued viability of that program. Under the present arrangement MAC "owns" the aircraft, but reservists provide one-half of the aircrews and a substantial amount of the support. This is the "Associate" concept; it differs from the usual direct transfer approach wherein the ARF user-organization owns the aircraft and has greater control over their operation. This latter form will be referred to here as the "Independent ARF" concept.

The advantages of the Associate concept are the greater control that can be exercised by the active force over first-line assets and the active force's ability to fill in vacancies in the ARF organization by assigning active duty personnel to those functions. A major disadvantage is the large size of MAC bases, which requires the Associate squadrons to recruit for much larger flying organizations than are typical for the ARF--as many as 108 aircrews for a single base rather than the more usual 30 or so. The smaller size of the dispersed Independent ARF squadrons may make them easier for reservists to

support. This fragmentation, however, also reduces the opportunities for economies of scale, which can adversely affect their potential cost savings.

This study compares the annual recurring costs of MAC/Associate and Independent ARF strategic airlift C-141 squadrons. It also describes the assumptions, data sources, and methods that were used in their calculation. The cost estimates are displayed in FY84 dollars and include estimates of the future retirement liability. They are intended to represent complete system costs, including the incremental support provided to the reserve units by the active force infrastructure. The basic approach is described in Ref. 1, Section III (Individual Squadron System Cost Analysis). Additional details regarding the methodology are found in Refs. 2 and 3, the latter work also being the source of more recent reservist cost factors. To facilitate the analysis, the cost factors are aggregated according to whether they vary with personnel strength, Primary Aircraft Authorization (PAA), or annual flying hours. The ARF recipients of the C-141s would incur some one-time investment startup costs, but when amortized over expected lifetimes these costs do not contribute significantly to the overall cost estimates.

C-141 STRATEGIC AIRLIFT FLEET

Table 1 shows the present distribution of MAC's C-141 fleet by location and operating organization. The 13 squadrons are located on five bases, three on the West Coast and two on the East Coast.[1] Travis AFB has two squadrons of C-5s as well as its two C-141 squadrons. McChord also has two squadrons of C-141s, and the other three bases each have three. The standard PAA per squadron is 18, giving MAC a total of 234 C-141s to help fulfill its wartime airlift responsibilities and to perform the bulk of its peacetime airlift missions.

[1]MAC's third East Coast base, Dover, is the home base of C-5s only.

Table 1

C-141 STRATEGIC AIRLIFT FLEET

Location	MAC Unit	Associate Unit	PAA
	22 AF		
McChord	62 MAW	446 MAW	
	4 MAS	97 MAS	18
	8 MAS	313 MAS	18
Norton	63 MAW	445 MAW	
	14 MAS	728 MAS	18
	15 MAS	729 MAS	18
	53 MAS	730 MAS	18
Travis[a]	60 MAW	349 MAW	
	7 MAS	708 MAS	18
	86 MAS	710 MAS	18
	21 AF		
Charleston	437 MAW	315 MAW	
	20 MAS	300 MAS	18
	41 MAS	701 MAS	18
	76 MAS	707 MAS	18
McGuire	438 MAW	514 MAW	
	6 MAS	335 MAS	18
	18 MAS	702 MAS	18
	30 MAS	732 MAS	18
Total			234

[a]Travis also has two squadrons of C-5s.

II. BASIC COST COMPARISON BETWEEN MAC/ASSOCIATE AND INDEPENDENT ARF C-141 SQUADRONS

PERSONNEL-RELATED COSTS

Manpower Requirements

C-141 USAFR Associate Manning. Table 2 displays the FY84 programmed manpower for the USAFR C-141 Associate squadrons located at Charleston, McChord, McGuire, and Norton AFBs (Ref. 4). Travis was excluded because the presence of C-5s would confuse the manning figures for common use activities. The reservist personnel are shown in that source document distributed by organization. For the ARTs[1] and other civilians, however, the document provides only gross totals. Headquarters MAC (XPPD) furnished the more detailed distribution of the ARTs in Table 2 on the basis of current unit manning reports.

C-141 Typical Squadron Manning. The initial set of manpower estimates in Table 3 shows the active duty manning distribution, by function, of a typical 18-PAA MAC C-141 squadron. These figures are from Table 4-7 of the Air Force's cost manual (Ref. 5) and exclude the collocated mission support units--aerial ports and aero-evacuation units. Base operating support is limited to the marginal fraction that tends to vary with base population.

The second set of manning figures is an attempt to develop a comparable personnel distribution for a typical USAFR C-141 Associate squadron. They are averages based on the figures in Table 2, including a pro rata share of wing headquarters personnel. By agreement with MAC, the reserve Associate share of aircraft maintenance accounts for only about 40 percent of the total. A possible benefit of a greater dispersal of the ARF C-141 units away from the large MAC bases might be

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[1]Air Reserve Technicians (known as Air Technicians in the Air National Guard). They are also reservist members of their organizations. They form the cadres of reservists who administer the ARF units and maintain the equipment full time throughout the year. They work under civilian employment rules and are paid civil service salaries for their full-time duties. For convenience in calculating personnel costs, they are treated separately in this study. However, care should be taken to avoid counting them twice in the manpower totals.

Table 2

C-141 USAFR ASSOCIATE MANNING, FY 1984

Organization	Charleston			Norton			McChord			McGuire		
	Off	Enl	ARTs/Civs	Off	Enl	ARTs/Civs	Off	Enl	ARTs/Civs	Off	Enl	ARTs/Civs
Primary Program Element												
Military airlift wing	22	83	34	19	84	31	24	68	30	23	84	32
Military airlift sqdn	88	133	18	86	133	18	80	133	17	80	133	18
Military airlift sqdn	74	133	17	74	133	18	74	133	17	74	133	17
Military airlift sqdn	74	133	17	74	133	17				74	133	17
Aircraft maintenance												
Avionics mtce sqdn	(3)	(139)	26	(3)	(171)	31	(2)	(114)	22	(3)	(171)	31
Field mtce sqdn	(8)	(508)	89	(8)	(476)	82	(4)	(320)	55	(8)	(476)	81
Organiz mtce sqdn	(8)	(415)	89	(8)	(415)	65	(5)	(277)	54	(8)	(415)	86
Total acft mtce	19	1062	204	19	1062	198	11	711	131	19	1062	200
Wpn sys security flt	1	26	1	1	26	1	1	26	1	1	26	1
Total PPE	278	1570	291	273	1571	283	190	1071	196	271	1571	285
BOS/Medical												
Airbase sqdn	8	80	11	6	47	13	6	43	11	8	85	12
Clinic	15	33	2	12	25	2	9	22	2	15	26	2
Communications flt	2	41		2	41		1	22		1	22	
Civil engineering sqdn				6	138	1	7	155	1			
Total BOS/Medical	25	154	13	26	251	16	23	242	14	24	133	14
Collocated Mission Spt												
Aerial port flt				2	69		2	69				
Aerial port sqdn	4	132		4	138		4	138		4	138	
Aerial port sqdn	4	138		4	138		4	138		4	138	
Aerial port sqdn	4	138		4	138					4	138	
Aerial port sqdn				4	138					4	132	
Aero-evacuation sqdn	95	146	5	95	146	5	95	146	5	95	146	5
Aero-evacuation sqdn										95	146	5
Medical svc sqdn				29	120		29	120		29	120	1
Total mission support	107	554	5	142	887	5	134	611	5	235	958	11
Grand total	410	2278	309	441	2709	304	347	1924	216	530	2662	310

SOURCES: Reservist manning from Ref. 4; ART distribution from MAC Hqs (XPPD), March 1984.

Table 3

C-141 TYPICAL MANNING: MAC/ASSOCIATE AND INDEPENDENT ARF SQUADRONS

	18-PAA MAC/Associate Squadron									Independent ARF Squadron								
	MAC Sqdn			Assoc Sqdn			Mobilized Total			18-PAA			9-PAA			2(9-PAA)		
Function	Off	Enl	Civs	Off	Enl	Techs[a]	Off	Enl	Civs	Off	Enl	Techs[a]	Off	Enl	Techs[a]	Off	Enl	Techs[a]
Primary PE																		
Cmd staff	15	28	1	10	36	29	25	64	1	25	65	98	24	58	68	48	116	136
Aircrew	72	128		72	126		144	254		144	254		72	127		144	254	
Acft mtce	9	444	72	6	354	67	15	798	72	15	870	308	8	435	186	16	870	372
W S secur		20		1	9		1	29		1	29	25	1	15	25	2	30	50
Total PPE	96	620	73	89	525	96	185	1145	73	185	1218	423	105	635	279	210	1270	558
Variable BOS/medical	7	75	16	9	71	5	16	146	16	16	162	54	8	86	28	16	172	56
(Fixed BOS)										(b)	(b)	40	(b)	(b)	40	(b)	(b)	80
Total	103	695	89	98	596	101	201	1291	89	201	1380	517	113	721	347	226	1442	694

NOTE: Excludes aerial port and other mission support units.

[a] Air Technicians are included in the Reservist manning counts.

[b] Independent ARF squadrons were assumed to deploy to MAC bases when mobilized. Reservists in "fixed BOS" functions were assumed to be training for Air Force-wide support in wartime and were excluded from these tabulations.

the ability to tap new geographical areas for trained ex-Air Force mechanics. Given the expected large wartime surge in flying hours (and the associated maintenance requirements) for our airlift forces, a greater share of the total maintenance effort could be turned over to the ARF if greater numbers of already-trained part-time reservist mechanics could be recruited. A careful selection of the units to receive the C-141s would enhance these prospects.

The third set of manning figures in Table 3 shows the combined totals of the MAC and Associate personnel when mobilized. These totals form the basis for the next set of figures designed for an Independent ARF C-141 squadron of 18 PAA aircraft. The number of reservists--the wartime manning requirement--should closely resemble the total manning of a combined MAC/Associate squadron. The (all-military) reservist manning of the Independent ARF squadron was increased in size to account for the civilians in the MAC unit.

Variable Base Operating Support (BOS) and medical support account for the number of personnel in these support activities that vary as a function of base population. The reservist variable support personnel were estimated as a percent of mission military personnel using the standard MAC estimating relationship. Fixed BOS (also known as the "base opening package") consists of activities such as base flight operations, base facilities support, and various overhead functions. These latter BOS activities are omitted from the cost estimates of marginal active force changes because USAF's base structure is strongly influenced by considerations other than number of aircraft--e.g., dispersal, geographical and political constraints, and expected wartime needs. This fixed BOS was omitted from the MAC/Associate figures and from the Independent ARF reservist figures, the latter on the assumption that for operational convenience these ARF airlift units will move to MAC bases when mobilized, where such functions already are manned.[2]

[2]This is the most economical approach and it should be feasible until a replacement aircraft for the C-141 is phased in. (Operation in wartime from separate ARF bases would require 200-300 more reservists per location to perform the fixed BOS functions, depending upon the ARF component and base type.) Even the ARF units that are programmed to deploy to active Air Force bases in wartime have reservists assigned to these fixed BOS positions. It is asserted, however, that their function

The full-time civilian Technicians who are needed to man these support functions in peacetime were estimated with the factors developed in Ref. 2. Technicians in both fixed and variable BOS activities were included in the tabulations because they all provide marginal peacetime support for a single flying unit.[3]

As the Technicians perform the peacetime aircraft maintenance function for the reserve flying units, their requirements depend on the planned level of peacetime flying hours. The ARF annual flying hour assumptions for this study--8,490 hours for the 18-PAA squadron and 5,140 hours for the 9-PAA squadron--are discussed later, in conjunction with Table 7. The maintenance Technicians were estimated with the ARF's factor of 30 maintenance manhours per flying hour for C-141s using the following formula:

$$\text{ARF Mtce Techs} = [(\text{monthly FHs})(30\ \text{MMHs/FH})(1.265)] \ / \ (145.3)(0.6)$$

The factor of 1.265 increases the direct aircraft maintenance manhours to account for the maintenance of support equipment and the maintenance overhead functions. Total maintenance manhours are converted to estimated maintenance manpower by dividing the monthly required manhours by 87.18--the standard productive hours per month of Technician mechanics (145.3) times 0.6, the availability factor.[4]

The fifth set of manning figures in Table 3 scales down the 18-PAA unit to a one-half squadron (9-PAA) deployment, a more typical size for an ARF flying unit. The reservist manpower estimate for these 9-PAA squadrons is seen to be roughly one-half that of the full-sized unit on the assumption that in wartime they will merge into full-sized units. The Technician peacetime BOS and command staffs, which contain functions

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is to provide Air Force-wide support when mobilized. Because these latter BOS reservists normally are not needed to support the collocated ARF units either in wartime or in peacetime, they were excluded from these manning tabulations. They should be justified and charged against the activities they are intended to benefit.

[3]USAFR flying units located on active Air Force installations have fewer Technicians in fixed BOS functions than on ARF or commercial air fields.

[4]AFRES (XPM), Robins AFB.

that do not scale directly with reductions in unit size, were augmented on the basis of C-130 units of similar size.

The last set of manpower estimates shows the total requirements of two such 9-PAA squadrons, for direct comparison with the 18-PAA units.

Personnel per Capita Cost Factors

Table 4 displays the costs that are estimated as a function of the number of active duty military and civilian personnel assigned to the MAC C-141 units. Separate factors are given for personnel types having large differences in pay rates or training costs.

The upper part of the table shows estimates of the total costs of acquiring and providing initial training for replacements of each specified personnel type. These total acquisition and training costs are then multiplied by appropriate Air Force annual turnover rates to derive average annual per capita replacement cost factors for each personnel type. To these replacement costs are added annual pay and allowances by personnel type, permanent change of station (PCS) travel, and the other costs that are estimated as a function of personnel. These personnel cost factors were provided in Ref. 5.

The military retirement cost factors attempt to take account of the unfunded future retirement cost liability. The retirement cost factors take the form of an annual per capita implied annuity "contribution." The amount is estimated as a constant percentage of basic pay sufficient to accumulate, during the service life of a typical cohort of officers or enlisted personnel, an annuity "fund" that could finance the total benefits of those who eventually qualify for retirement. The OSD actuary estimates the retirement factors for officers as 71 percent of basic pay (Ref. 6). For enlisted personnel the factor is 40 percent of basic pay.[5]

Table 5 shows the corresponding per capita costs for reserve personnel. The military personnel costs are based on FY83 factors developed in Ref. 3. Average ANG/USAFR rates were scaled up to FY84 dollar values using the ratio of the pay rates of comparable active duty personnel types in the two time-periods.

[5]Reference 5 (AFR 173-13) uses the total military personnel retirement factor (51 percent) for both officers and enlisted personnel.

Table 4

USAF ACTIVE DUTY PERSONNEL PER CAPITA COST FACTORS (CONUS)

(FY84 dollars)

Cost Element	Officers			Airmen		Civilians (MAC)
	Rated					
	Pilot	Other	Other	Aircrew	Other	
Total Acquis & Trng						
Acquisition	38,840	38,840	38,840	2,594	2,594	
School trng (ATC)[a]	275,707	54,227	8,746	3,648	7,394	
Total acq & trng	314,547	93,067	47,586	6,242	9,988	
Ann. turnover rate	.115	.102	.076	.164	.164	
Average Annual Cost						
Pro rata acq & trng	36,173	9,493	3,617	1,024	1,638	
Pay and Allowances	40,074	40,074	36,451	18,225	16,855	23,674
PCS Travel	1,170	1,170	1,170	442	442	
BOS Nonpay	4,748	4,748	4,748	4,748	4,748	4,748
Medical O&M nonpay	758	758	758	758	758	
Retirement accrual[b]	19,693	19,693	19,693	4,701	4,701	(c)
Total	102,616	75,936	66,437	29,898	29,142	28,422
Rounded	102,600	75,900	66,400	29,900	29,100	28,400

SOURCE: Reference 5, Tables 3-1, 3-5, 3-7, 3-10; CORE model factors, Fig. 7-1.

[a]Excludes training conducted by the major commands.

[b](.71)(officer basic pay--$27,736); (.40)(enlisted pay--$11,752).

[c]Civilian pay already includes a government retirement contribution of 7 percent. The civilians contribute another 7 percent toward their own retirement fund.

Table 5

ARF PERSONNEL PER CAPITA COST FACTORS

	Officers		Enlisted		
Cost Element	Pilots	Non-rated	Aircrew	Other	Technicians
FY83 Dollars[a]					
Pay	8,460	5,255	4,218	2,532	27,326
Other pers costs	1,340	1,340	1,264	1,264	1,497
Acquisition	42	42	150	150	
Special training	2,348	2,348	444	444	
Total direct	12,190	8,985	6,076	4,390	28,823
FY84/FY83 Adjustment[b]	+10%	+10%	+9%	+9%	--
FY84 Dollars					
Total direct	13,409	9,884	6,623	4,785	30,129[c]
School trng (ATC)[d]	10,477	726	77	614	
Retirement[e]	5,412	3,444	832	832	(f)
Grand Total	29,298	14,054	7,532	6,231	30,129
Rounded	29,300	14,100	7,500	6,200	30,100

[a]Average of ANG and USAFR per capita factors in Ref. 3, Tables A-1 and A-17.

[b]Adjusted to FY84 values on the basis of the change in active duty personnel pay and allowance factors for FY83 and FY84 in Ref. 5.

[c]Reference 5. ($28,479) + $1,650, the FY83 "other personnel cost" inflated to FY84 dollars.

[d]See text for derivation.

[e](.71)(ARF officer basic pay of $77/manday)(MDs). Pilots=99 MDs; other officers=63 MDs). (.40)(ARF enlisted basic pay of $33/manday) (63 MDs).

[f]Technician pay already includes a government retirement contribution of 7 percent. The Technicians contribute another 7 percent toward their own retirement fund.

Reservists receive considerably less annual pay than do active duty personnel partly because they do not receive housing allowances and other benefits that are a part of the active duty pay package. The primary reason, however, is that reservists are part-time personnel who are paid on the basis of actual time served rather than a fixed annual amount. Daily base pay for reservists, defined as 1/30th of the monthly pay of active duty personnel of comparable rank, is earned for each authorized manday (MD) or training assembly that the reservists attend. This normally amounts to about 65 paid MDs for non-rated personnel and about 100 MDs for those on flying status. The average cost per reservist covers monthly drills, the annual two-week active duty tour, and additional flying training periods (for aircrews). The greater number of MDs authorized for reservists on flying status is one of the principal reasons for the higher personnel costs of aircrew members.

To be consistent with the cost factors developed for active duty personnel, the school training factors include the same staff and O&M[6] costs as those required to train the active duty personnel. They contain more than the training costs that are included in the ARF budgets for training; the latter are limited to the reservists' pay and allowances, travel, clothing, etc. The aircraft operating costs generated in the Undergraduate Pilot Training (UPT) course, for example, are included in the ARF school training factors shown in Table 5.

The factor for estimating the annual cost for training reservist pilots is derived by first multiplying the training cost per man, shown in Table 4, times the average number of officers in the ARF programmed annually for this training. This total annual pilot training cost is then divided by the total number of reserve pilots in the force to obtain an average per capita cost factor that can be used to estimate the average cost of pilot annual replacement training for individual flying units.

The training factors for the other ARF personnel are similarly derived. Although charging the reserve units with the full cost of their school training does add considerably to the per capita costs of ARF personnel, particularly rated personnel, these training costs do not figure prominently in the overall system cost of reserve units.

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[6]Operations and maintenance.

Because these general personnel cost factors are intended to represent annual recurring costs, the one-time "school training" costs of converting squadrons from one type of aircraft to another are not included in this table. They are discussed later in the section on the investment startup costs of the Independent ARF squadrons. Also excluded from this pro rata allocation are the special training MDs of the "Service Mission and Mission Support" budget category that cover alert duty and other missions not relevant to C-141 squadrons. Other exclusions from these general ARF personnel costs are the administrative overhead categories in the budget that do not vary with changes in the force structure.

The studies underway in the Federal government concerning military retirement costs have thus far yielded only a single set of cost factors, covering both active and reserve personnel. Because they are calculated as a percent of basic pay, the reserve cost factors (in dollar terms) are lower than those shown in Table 4 for the active duty personnel. Intuitively, this difference is in the right direction: Military personnel on active duty can retire after 20 years of service with pensions that begin immediately, whereas the pensions of reservists do not begin until they reach the age of 60. During this interim period between retirement and age 60, the implied reservist annuity fund would increase in value because of cumulative interest, thereby reducing the required annual per capita contribution during the years of military service by a compensatory amount. Also, retirement credits for the years spent in a reserve component average only about 20 percent as much as an equivalent number of years spent on full-time active duty.

But there are some offsetting considerations: Active duty personnel have higher turnover rates than reservists. Therefore, a smaller proportion of an active duty cohort will receive the retirement benefit than would be true of a corresponding reservist cohort. This reduces the size of the required total active duty retirement annuity while permitting its accumulation to be averaged over the large fraction of total personnel who will terminate their service before qualifying for retirement. These considerations tend to close the gap somewhat between the average per capita annual retirement "contributions" of active duty personnel and reservists.

The net effect of these retirement cost considerations is uncertain. Eventually the DoD actuary may produce separate sets of retirement annuity factors for active duty and reservist personnel. Meanwhile, using the common annuity percentage factors instead probably does not affect the relative costs of the MAC/Associate and Independent ARF units by more than a few percentage points in either direction.

Total Personnel-Related Costs of Typical C-141 Squadrons

Table 6 shows the calculation of manpower costs on the basis of the manpower figures for typical squadrons in Table 3 and the cost factors shown in Tables 4 and 5. As is stated in the footnote to Table 6, the cost of rated members of the overhead supervisory staff is estimated using the cost of pilots. The size of this rated overhead group for the MAC and Associate squadrons is given in Table 4-4 of Ref. 5. For the Independent ARF squadrons, it was estimated on the basis of C-130 squadrons of roughly comparable size.

Table 6 clearly shows the effect on the cost estimates of differences in the number of overhead rated personnel required by the different types of organizations. For example, the 9-PAA Independent ARF squadron manpower costs are significantly higher than those in the corresponding reserve Associate column. Also, the last personnel category shown in the table, "Civilians/Technicians," reveals the importance of these full-time personnel in the ARF cost structure.[7]

AIRCRAFT-RELATED COSTS

C-141 Annual Flying Hours

The flying hours for the MAC/Associate squadrons shown in Table 7 are projections from Ref. 7. The flying hour figure for 9-PAA Independent ARF squadrons is a weighted average based on estimates of the National Guard Bureau (NGB/XOX) for C-141 squadrons led by either a group or a wing headquarters. The weighting was the typical three-squadron structure of two groups and one wing organization.

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[7]The ANG has replaced some of the civilian Technicians with "AGRs"--full-time military reservists. In the context of the overall ARF unit costs, these substitutions would not have a significant effect on the comparisons.

Table 6

MANPOWER COSTS OF TYPICAL C-141 MAC/ASSOCIATE AND INDEPENDENT ARF SQUADRONS

(Costs in FY84 dollars)

Category	MAC/Associate Sqdns			Independent ARF Sqdns		
	MAC	Associate	Total	18-PAA	9-PAA	2(9-PAA)
PAA/squadron	18	--	18	18	9	18
Personnel Type						
Officers						
Pilots						
Number[a]	87	78	165	166	93	186
Per capita cost($)	102,600	29,300		29,300	29,300	29,300
Total cost ($000)	8,926	2,285	11,211	4,864	2,725	5,450
Other						
Number	16	20	36	35	20	40
Per capita cost($)	66,400	14,100		14,100	14,100	14,100
Total cost ($000)	1,062	282	1,344	494	282	564
Enlisted						
Aircrew						
Number	128	126	254	254	127	254
Per capita cost($)	29,900	7,500		7,500	7,500	7,500
Total cost ($000)	3,827	945	4,772	1,905	953	1,906
Other						
Number	567	470	1,037	1,126	594	1,188
Per capita cost($)	29,100	6,200		6,200	6,200	6,200
Total cost ($000)	16,500	2,914	19,414	6,981	3,683	7,366
Civilians/Technicians						
Number	89	101	190	517	347	694
Per capita cost($)	28,400	30,100		30,100	30,100	30,100
Total cost ($000)	2,528	3,040	5,568	15,562	10,445	20,890
Total pers cost($000)	32,843	9,466	42,309	29,806	18,088	36,176

[a]Pilot strength includes rated overhead supervisory staff: MAC=15, Assoc.=6, Independent ARF(9 PAA)=21, Independent ARF(18 PAA)=22.

Table 7

C-141 ANNUAL FLYING HOURS

	MAC/Associate Squadrons						Independent ARF Squadrons		
	13-Squadron Total Force[a]			Per Squadron					
Category	MAC	Assoc	Total	MAC	Assoc	Total	18-PAA[b]	9-PAA[c]	2(9) PAA
PAA	234	--	234	18	--	18	18	9	18
Crew ratio	2.0	2.0	4.0	2.0	2.0	4.0	4.0	4.0	4.0
Line crews	468	468	936	36	36	72	72	36	72
Flying hour requirements									
Copilot reqs									
CP local tng	15,287		15,287	1,176		1,176			
Global	76,112		76,112	5,855		5,855			
Other	109,774		109,774	8,444		8,444			
Total CP	201,173		201,173	15,475		15,475			
Other local tng	13,370	21,709	35,079	1,028	1,670	2,698			
Other global		38,690	38,690		2,976	2,976			
Total FHs	214,543	60,399	274,942	16,503	4,646	21,149	8,490	5,141	10,282
Rounded				16,500	4,650	21,150	8,490	5,140	10,280

[a] MAC Headquarters(DOOAC) C-141 flying hour projection for FY86.

[b] Rand estimate.

[c] National Guard Bureau(XOX) estimate.

The flying hour estimate for the 18-PAA (72 aircrews) squadron was approximated simply by increasing by 65 percent the flying hour estimate of the typical 9-PAA (36 aircrews) squadron. This is the same percentage relationship that was found to exist between the flying hour figures developed by the NGB for 9-PAA typical squadrons with alternative crew ratios of 2.0 and 4.0, which also encompassed a doubling of the number of line crews. The flying hours do not double because the number of overhead rated personnel remains almost the same for the two squadron sizes.

The intensive flight program required for the training of copilots is the principal flying hour driver of the MAC C-141 active duty units. The experiencing consists not only of familiarization with aircraft operations, aerial refueling, emergency procedures, and landing and takeoff procedures, but also with MAC's worldwide route structure, cargo and passenger handling, and overflights of foreign-controlled land masses. Most of the flight training needed for the aircraft commanders is subsumed under the requirements that are authorized to train and experience or mature the new copilots to enable them to qualify eventually for the left seat. The figure for "other local training" covers certain proficiency, evaluation, and special training events needed by the aircraft commanders and overhead pilots that cannot be accommodated during the copilot training flights.

C-141 Aircraft-Related Annual Cost Factors

The aircraft-related annual operating cost factors for C-141 aircraft, shown in Table 8, were provided in Ref. 5, AFR 173-13. Some are based on the number of authorized aircraft, and others are assumed to vary with peacetime flying hours. These factors differ from MAC's ASIF factors for cost per flying hour. The latter include civilian pay and also are intended to recover the fixed annual costs per PAA as a part of their charge per flying hour. The factors in Table 8 represent average life cycle "steady state" annual costs. It is assumed that for these first-line aircraft, the aircraft cost factors would be approximately the same whether the aircraft are operated by active units or by ARF units.

Table 8

C-141 AIRCRAFT RELATED ANNUAL COST FACTORS

(FY84 dollars)

Element	Cost
Cost per PAA	
Common suppt equip	22,700
Class IV mod kits[a]	84,410
Depot maintenance	296,336
Total per PAA	403,446
Cost per flying hour	
Replenishment spares	200
Base misc supplies	240
Aviation fuel	2,045
Depot maintenance	198
Total per fly hr	2,683

SOURCE: Ref. 5: pp. 10, 14, 113.

[a]Mod kits cost = $4,203 (FAC)$^{.9343}$

Flyaway cost (FAC) = $24.8 million.

Aircraft-Related Costs of Typical C-141 Squadrons

Table 9 shows the relative importance of the aircraft-related costs that are computed on the basis of the cost factors shown in Table 8. The number of flying hours shown for the 9-PAA (36 aircrews) Independent ARF unit exceeds the flying hours of the comparable Associate squadron because of the larger number of overhead rated personnel, not because the line crews fly more.

Table 9

AIRCRAFT RELATED ANNUAL COSTS OF C-141 SQUADRONS

(Costs in FY84 dollars)

Cost Element	Cost Factor ($)	MAC/Associate Sqdns			Independent ARF Sqdns		
		MAC	Associate	Total	18-PAA	9-PAA	2(9) PAA
PAA-related costs	403,446						
PAA/squadron		18	--		18	9	2(9)
PAA cost/sqdn ($000)		7,262		7,262	7,262	3,631	7,262
FH-related costs	2,683						
Ann fly hrs/sqdn		16,500	4,650	21,150	8,490	5,140	10,280
FH cost/sqdn ($000)		44,269	12,476	56,745	22,779	13,791	27,582
Total acft-related costs ($000)		51,531	12,476	64,007	30,041	17,422	34,844

OTHER COSTS

Additional Investment for Independent ARF C-141 Squadrons

The transfer of C-141 aircraft from MAC/Associate squadrons to Independent ARF units would result in some additional one-time investment costs, as shown in Table 10. These include support equipment, airport facilities, and some conversion training.[8] The need for additional support equipment arises because the C-141 operates from large wing bases, which produce economies of scale. A single expensive item of equipment may be adequate for the needs of two or three

[8]The USAFR hopes to minimize this expense by its concept of an "in-place transfer of assets;" i.e., an Associate squadron simply takes ownership of the C-141s it operates on the MAC base. Transfers to other locations would be necessary to the extent that the available reservist recruiting base proved inadequate to support the additional manpower requirements of an independent operation.

squadrons located together, for example, but if such equipment is needed at each deployment location then additional items must be procured if these squadrons are dispersed. The problem is accentuated when 18 aircraft are deployed to two locations rather than to a single 18-PAA base.

Table 10

ADDITIONAL INVESTMENT FOR INDEPENDENT ARF SQUADRONS

(Costs in millions of FY84 dollars)

Category	Total Cost	Expected Life (Yrs)	Average Annual Cost
Support equipment[a]			
Additional equipment to permit C-141s to operate as independent squadrons			
18-PAA squadron	$1.2	10	$.120
9-PAA squadron	$0.8	10	$.080
Base facilities			
Runway and other pavement extension and improvement	Depends on type, size, and number of existing facilities	20	Unk
Maintenance hangars and shops		20	Unk
Administration and training buildings		20	Unk
Other		20	Unk
Conversion training[b]			
Manday costs			Unk
Flying-hour and other costs			Unk

[a]Excludes flight simulators and terminal facilities for freight and passengers. Estimate by MAC Headquarters (LGXP).

[b]Additional one-time costs incurred for squadron certification.

The estimates do not include the cost of flight simulators or terminal facilities on the Independent ARF bases. It is assumed that these functions would continue to be performed only on the active MAC installations.

The extent of construction and other airfield improvements that might be required by the transfer of the C-141 operation to Independent ARF squadrons depends largely on the number and type of such facilities on the receiving ARF airfields. It also depends on whether it might be feasible to conduct some of the heavy maintenance of the C-141s at existing facilities on the MAC airbases.[9] In any event, assuming a 20-year life, these costs are not significant to the results of this study and they can be safely disregarded.

The cost of establishing or converting an existing ARF squadron to operate a new aircraft requires extensive training of aircrews and maintenance personnel. The amount of such one-time training, however, depends to a large extent on the previous experience of the ARF personnel. For the purposes of this study, these one-time investment costs are converted to amortized average annual costs, so the effect of this training also depends on how long the squadrons are intended to operate the C-141s before another conversion takes place. If the C-141s will remain at their new locations for as long as ten years, this amortized investment cost would not be an important element of the cost comparison and it also can be disregarded.

COMPARISON OF AVERAGE ANNUAL COSTS OF C-141 MAC/ASSOCIATE AND TYPICAL INDEPENDENT ARF SQUADRONS

Table 11 summarizes the total costs of the alternative MAC/Associate and Independent ARF squadron alternatives, with a breakout by cost driver: personnel, number of aircraft, flying hours, and amortized investment. Given the basic, unqualified assumptions related to these cost drivers, the Independent ARF squadrons are shown to be significantly less costly to operate.

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[9]According to MAC spokesmen, "Queen Bee" facilities are probable in the 1990s or when large numbers of MAC aircraft are transferred to the ARF. Meanwhile, the first ARF units would have a stand alone maintenance capability.

Table 11

COMPARISON OF TOTAL ANNUAL COSTS OF MAC/ASSOCIATE AND INDEPENDENT ARF SQUADRONS

(Costs in thousands of FY84 dollars)

Category	MAC/Associate Sqdns			Independent ARF Sqdns		
	MAC	Associate	Total	18-PAA	9-PAA	2(9-PAA)
Line aircrews	36	36	72	72	36	72
Personnel costs	32,843	9,466	42,309	29,806[a]	18,088[a]	36,176[a]
PAA-related costs	7,262	--	7,262	7,262	3,631	7,262
FH-related costs	44,269	12,476	56,745	22,779	13,791	27,582
Amortized investment				120	80	160
Grand total	84,374	21,942	106,316	59,967	35,590	71,180
Tradeoff ratio			1.00	0.56		0.67

[a]The Independent ARF personnel costs assume that the ARF squadrons will deploy to MAC bases in wartime. Conducting the wartime operations from individual ARF airfields would require additional reservists for the so-called fixed BOS functions. This would add approximately $2.5 million a year to the cost of ARF C-141 units deployed on commercial airfields. For USAFR units deployed in peacetime on non-MAC Air Force bases, the additional cost would be about $1.5 million.

If an 18-PAA MAC/Associate squadron is redeployed on a single ARF base, savings of more than 40 percent are indicated; even a deployment of two 9-PAA squadrons is shown to save one-third of the cost of a comparable MAC/Associate squadron.

This "straightforward" analysis is flawed, however, in that it assumes that all of the costs of these alternatives would be subject to the cost tradeoff. That is, it assumes that if 18 C-141s were transferred to the ARF, to be operated at two 9-PAA installations, the displaced MAC/Associate unit would save $106.7 million a year, less the ARF offset of $71.3 million for a net saving of $35.1 million a year. This is not the case. The large C-141 flying training program is

designed to produce trained aircrew personnel not only for the C-141 force but also for the C-5 fleet, whose aircraft are too expensive to permit it to experience its own copilots, and also to provide replacement personnel for the rated supplement and for those positions in the overhead structure of the Air Force that call for rated personnel. These C-5 and overhead rated personnel requirements would continue essentially as before, unaffected by any change in the active C-141 force structure.[10] Moreover, because the ARF crews would contribute fewer flying hours to the peacetime airlift mission, out-of-pocket transportation costs would rise.

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[10]This is also true of the drain to commercial airlines, which also rely on the Air Force as their primary source of trained pilots.

III. MARGINAL COST COMPARISON

MARGINAL FLYING HOUR ESTIMATES FOR MAC ACTIVE DUTY CREWS

The additional pilot experiencing assigned to the C-141 force (beyond that needed simply to sustain their own crew requirements) does not result in a larger number of C-141 crew authorizations;[1] it results, instead, in a faster flow-through (turnover rate) of the pilots than would otherwise be the case. Major F. R. Starbuck (AF/MPXXX) refers to this as the "Venturi effect." Moreover, because certain specified minimum experience requirements are established for each step of a pilot's career progression, the greater the number of experienced pilots that must be produced in a given period by the C-141 fleet, the greater the number of flying hours per year that must be programmed.

The first two columns of Table 12 show the planned annual flying hours of the MAC active duty C-141 crews both in terms of the total fleet and as the average for each of the squadrons. In fact, however, less than half of this number of flying hours is attributable to the requirements of the C-141 force alone: According to a MAC Headquarters (DOTM) internal study, airlift pilots remain in the Air Force about 10 years after completing their undergraduate pilot training.[2] During that period the C-141 fleet produces more than 2,000 experienced active duty airlift pilots, whereas its requirements consist of only the 936 pilot authorizations.[3] Therefore, the estimated MAC flying hour requirements that would be saved as a result of the transfer of a C-141 squadron to the ARF are only the 7,680 hours shown in the Marginal column, not the full 16,500. The requirement for the other 8,820 hours, for training its share of the C-5 and rated overhead pilots, is unchanged; but now it must be added to the burden of the remaining squadrons, as shown in the MAC Remainder column. This marginal flying hour estimate is developed in Table 13.

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[1] An attempt by MAC to increase the C-141 crew ratio in the mid-1970s was turned down by the Congress.

[2] This is the long-term average. The actual year-to-year retention of pilots by the Air Force varies considerably, depending on many factors. One of the primary factors is the demand for new aircrew personnel by the commercial airlines (Ref. 8).

[3] (234 aircraft)(2-pilot crews)(2.0 crew ratio).

Table 12

MARGINAL ANNUAL FLYING HOUR ESTIMATES FOR MAC ACTIVE DUTY C-141 AIRCREWS

Category	Total MAC C-141 Fleet FH Reqs	MAC Squadrons: Flying Hour Requirements Per Squadron		
		Average	Marginal	Remainder
PAA	234	18	18	
Crew ratio	2.0	2.0	2.0	
Line aircrews	468	36	36	
Flying hour requirements				
Copilot reqs				
CP local tng	15,287	1,176		
Global	76,112	5,855		
Other	109,774	8,444		
Total CP	201,173	15,475	7,200	8,275
Other local tng[a]	13,370	1,028	478	550
Other global				
Total FHs	214,543	16,503	7,678	8,825
Rounded	214,500	16,500	7,680	8,820

[a]Portion not appropriate for copilot experiencing. Total local training for MAC active duty crews requires 28,660 flying hours, of which 15,290 hours are subsumed under copilot experiencing.

Table 13

DETERMINANTS OF FLYING HOUR REQUIREMENTS OF C-141 ACTIVE DUTY SQUADRONS

Career Progression	Total No. of Pilots	Pct of Total	Cum Career FHs	Total FHs/ Step	Duration (Yrs to Achieve)	Ann FHs/ Pilot	Fleet Annual FHs
Total C-141 Flying hours							
Copilot	234	.25	700[a]	500	1.16	430[b]	100,587
First pilot	234	.25	1,200	500	1.16	430[b]	100,586
Acft cmdr	468	.50	(c)	(c)	2.33	(c)	(c)
Subtotal	936	1.00			4.65		201,173
Additional local trng[d]							13,370
Total							214,543
(Avg FHs/sqdn)							(16,503)
(Rounded)							(16,500)
Marginal C-141 Requirements							
Copilot	234	.25	700[a]	500	2.5	200	46,800
First pilot	234	.25	1,200	500	2.5	200	46,800
Acft cmdr	468	.50	(c)	(c)	5.0	(c)	(c)
Subtotal	936	1.00			10.0		93,600
Additional local trng[e]							6,221
Total							99,821
(Marginal FHs/sqdn)							(7,678)
(Rounded)							(7,680)

[a]Assumes 200 flying hours prior to C-141 assignment.

[b]Mixture of UPT graduates and First Assignment Instructor Pilots. The UPT graduates are projected by MAC to fly about 500 hours per year; FAIPs fly about 275 hours per year.

[c]Accomplished during the flying hour minimums for copilots and first pilots, except for the additional local training noted in the table.

[d]Portion not appropriate for copilot experiencing. Total local training for MAC active duty crews requires 28,660 flying hours, of which 15,290 hours are subsumed under copilot experiencing.

[e]Scaled to other marginal flying hours. This is equal to 478.5 flying hours per squadron. The balance of 7,150 flying hours covers the local training needs of the other aircrews.

DETERMINANTS OF THE FLYING HOUR REQUIREMENTS OF C-141 SQUADRONS

Table 13 displays the basic elements that determine the total and the marginal flying hour requirements for C-141 squadrons. The upper portion of the table illustrates the present flying hour program. To produce more than twice as many trained and experienced pilots than are needed to sustain the C-141 force alone, it is necessary to complete a turnover of the C-141 pilot force at more than twice the pilot attrition rate--i.e., in 4.7 years rather than 10 years. As indicated in the first column, when the system is in balance, one-half of the pilots are aircraft commanders and the others are copilots or first pilots, the latter being copilots with a fair amount of experience in the aircraft. For planning purposes, MAC assumes that the average pilot entering the C-141 force has about 200 flying hours to his credit. To meet the established first pilot experience milestone in the time allowed, the copilot has about 1.2 years to accomplish 500 more flying hours, which equates to about 430 hours per year. This figure times the 234 copilots in the force results in a total of about 100,590 annual flying hours.

A first pilot needs 1,200 hours to qualify for upgrade to the aircraft commander position at the 2.3-year point. This can be accomplished by a flying hour program that is essentially the same as that of the entry-level copilot. Together, they generate almost all of the required flying hours of the squadron. The aircraft commanders also have their milestones to achieve but most of these can be performed at the same time that the copilot requirements are being logged. They do not result in additional hours except for the 13,370 hours of additional local training. This, together with the copilot experiencing, sums to the total annual active duty flying hour program of about 214,500 hours for the C-141 fleet and 16,500 hours for the average squadron that are shown earlier in Tables 7 and 12.

Using the same approach, it is possible to calculate the flying hours for the C-141s if the training requirements were limited to the C-141 fleet's marginal requirements alone. The turnover rate could be reduced and the copilot experiencing could be accomplished over five years rather than 2.3 years. This situation is illustrated in the

bottom portion of Table 13 where the milestones are distributed over this longer period. The total annual flying hours required for the copilots and first pilots are reduced to 46,800 for each type, or 93,600 hours for both. If the C-141 local training is scaled by the same proportion, the local training needed in excess of the copilot experiencing time drops to about 6,220 and the total annual flying hours for the active duty squadrons drop to a little under 100,000. That reduces the total flying hours per active duty squadron from the present 16,500 to about 7,680. That level (plus the flying hours of the Associate squadron) represents the marginal flying hours that actually could be saved if 18 aircraft were transferred from the MAC/Associate fleet to Independent ARF squadrons. The remaining MAC/Associate C-141 fleet still would have to produce 262,620 flying hours: 92,160 for the marginal force sustaining requirements of the 12 remaining C-141 squadrons active duty squadrons; the constant 114,660 hours needed to support the C-5, rated supplement, and overhead pilot requirements, which would continue as before; and the 55,800 flying hours of the reserve Associate squadrons. Figure 1 depicts the marginal flying hours of the MAC squadrons separately from the "fixed" flying hours needed to train pilots for the C-5 and other activities.

Following the C-141 squadron transfer to the ARF, only 864 C-141 crew slots would be left for this flying, rather than the previous 936. The effects of this diminished base are addressed in a later section.

COMPARISON OF THE MARGINAL ANNUAL COSTS OF MAC/ASSOCIATE AND INDEPENDENT ARF C-141 SQUADRONS

Reducing the annual flying hour rate for the MAC active duty C-141 squadrons from the average 16,500 hours used in the previous cost comparison to the more relevant marginal 7,680 flying hours estimate derived in Table 13 results in the revised annual cost comparison shown in Table 14. Here the MAC column shows only the cost that would actually be saved by the active duty units because of the transfer of the stated C-141 assets to Independent ARF squadrons, in this case $60.7 million. Only the costs related to flying hours were reduced; the number of maintenance personnel would be unaffected by this allocation change because, at this point, they still are predicated on wartime

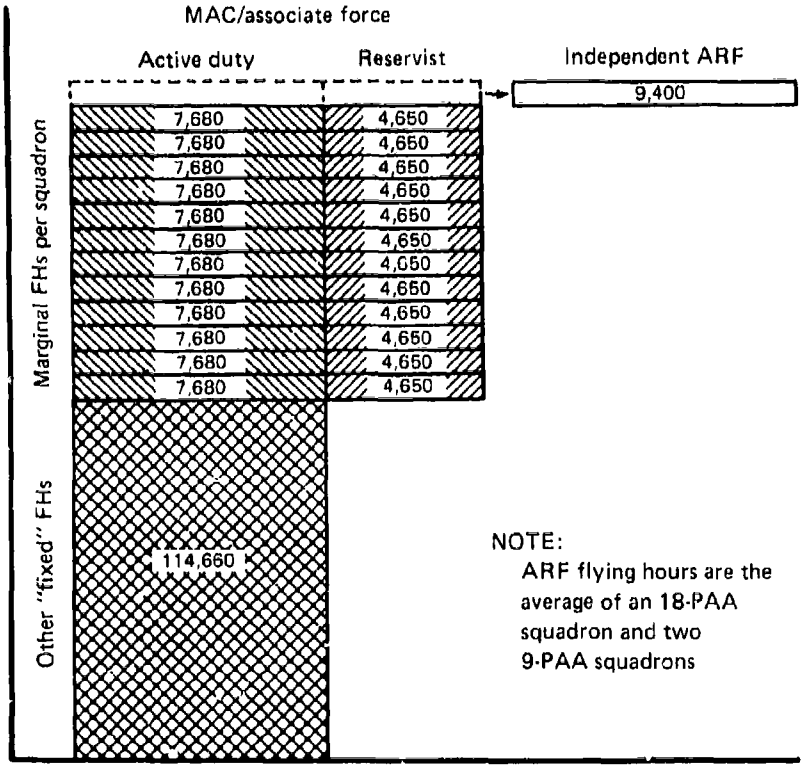

Fig. 1 — Annual C-141 flying hours, by component (after transfer of one squadron to independent ARF)

Table 14

COMPARISON OF THE TOTAL MARGINAL ANNUAL COSTS OF MAC/ASSOCIATE AND INDEPENDENT ARF SQUADRONS

(Costs in thousands of FY84 dollars)

	MAC/Associate Sqdns			Independent ARF Sqdns		
Category	MAC	Associate	Total	18 PAA	9 PAA	2(9) PAA
Number of line aircrews	36	36	72	72	36	72
Personnel costs	32,843	9,815	42,658	29,806	18,088	36,176
PAA-related costs	7,262		7,262	7,262	3,631	7,262
FH-related costs	20,605	12,476	33,081	22,779	13,791	27,582
Amortized investment				120	80	160
Grand total	60,710	22,291	83,001	59,967	35,590	71,180
Tradeoff ratio			1.00	0.72		0.86

flying hour rates. With the revised (marginal) MAC flying hour requirement, the tradeoff ratio indicates approximately a 25 percent saving in the case of an 18-PAA ARF squadron deployed on a single base, or about 15 percent if the 18 aircraft are deployed as two 9-PAA squadrons at separate locations.[4]

[4] If the MAC/Associate C-141 squadrons were to be separated into 9-PAA active duty and reserve halves before their transfer to Independent ARF operation, the result would be the same. The conversion of the active duty half to an Independent ARF squadron would save $25.1 million ($60.7-$35.6 millions), 41 percent of the active duty cost. However, the Associate squadron depends upon the active duty members of the combined MAC/Associate unit for a large share of its maintenance and support requirements. (The active duty squadron also carries the entire burden of the annual cost-per-PAA expense.) Permitting the 9-PAA reserve squadron to function independently would require an additional $13.3 million ($35.6-$22.3 millions). Thus, the net saving overall per transferred C-141 squadron would be the same as that indicated in Table 14.

These marginal savings of the transfer of C-141 assets to the ARF will tend to decline even more if many squadrons are transferred before a replacement aircraft of comparable size is procured to perform the Air Force's pilot experiencing and peacetime transportation services.

IV. OTHER COST CONSIDERATIONS

EFFECT OF C-141 TRANSFERS TO THE ARF ON THE REMAINING MAC/ASSOCIATE FORCE

Increased Peacetime Daily Utilization Rate

As noted earlier, the extensive training and experiencing of copilots for positions other than in the C-141 fleet, per se, would be unaffected by the disposition of the C-141 fleet. The results of transferring additional C-141 squadrons to the ARF, therefore, would be a gradual increase in the number of flying hours required for the remaining aircraft and crew members, to support the higher turnover rates that would be needed to perform this additional training. The estimates in Table 15 show the effects on the C-141 daily utilization (UTE) rate of cumulative transfers of C-141 assets up to one-half of the current force.

Table 15

EFFECT OF C-141 TRANSFERS TO ARF ON THE REMAINING MAC/ASSOCIATE FORCE'S PEACETIME DAILY UTILIZATION RATE

Sqdns Transferred	Remaining MAC/Associate C-141 Force							
	Tot Sqdns	Tot PAA	MAC Active Duty Crew FHs			Assoc Crews FHs	Total Flying Hours	Daily UTE Rate
			Marginal	Remainder	Total			
0	13	234	99,840	114,660	214,500	60,450	274,950	3.2
1	12	216	92,160	114,660	206,820	55,800	262,620	3.3
2	11	198	84,480	114,660	199,140	51,150	250,290	3.5
3	10	180	76,800	114,660	191,460	46,500	237,960	3.6
4	9	162	69,120	114,660	183,780	41,850	225,630	3.8
5	8	144	61,440	114,660	176,100	37,200	213,300	4.1
6	7	126	53,760	114,660	168,420	32,550	200,970	4.4
7	6	108	46,080	114,660	160,740	27,900	188,640	4.8

The first three columns of Table 15 indicate the changes in ownership of the C-141 assets. This information is followed by their effect on the required flying hours of the active duty and Associate crews that remain. The marginal flying hour requirements of the active crews (7,680) vary with the number of squadrons that remain with MAC. The "Remainder" refers to the other pilot-experiencing flying hours (114,660) that are fairly constant regardless of the size of the MAC C-141 fleet. The flying hours of the reserve Associate squadrons (at 4,650 per squadron) are included in their entirety because they would vary directly with the number of remaining MAC squadrons.

The resultant daily UTE rate for MAC, shown in the final column, is seen to rise from the current 3.2 to 4.8 as the number of squadrons transferred to the ARF is increased to as many as seven. The incremental rise per squadron transferred is displayed in Fig. 2.

The planned wartime sustained daily UTE rate of 10 and a wartime factor of 146.4 productive maintenance manhours per month is equivalent to a peacetime capability of 5.9 hours a day for the same total manpower and a peacetime combined productivity/availability factor for military personnel of 87. However, as Table 3 revealed, the peacetime maintenance manning of a MAC/Associate squadron (including the Associate squadron's full-time ARTs) amounts to only two-thirds of the total wartime maintenance manning, when the reservists are mobilized. This scales the 5.9 UTE rate down to a maximum peacetime normal capability of about 3.9. Assuming the validity of these average factors, Table 15 suggests that a transfer of more than four squadrons of C-141s to the ARF would require additional full-time maintenance manning to support the increased peacetime flying hour requirements of the remaining C-141 squadrons. Augmenting the maintenance units with additional full-time mechanics could cut into the savings indicated in Table 14 for C-141 transfers to the ARF beyond four squadrons because full-time mechanics cost about five times more than reservists.[1] Beyond some point, it

[1]Since the ARF squadrons fly less than one-quarter as much as the active C-141 units, the Independent ARF squadrons may be able to conduct their training with fewer than nine aircraft for 36 crews. Leaving the excess C-141s with the remaining MAC squadrons might help to relieve any scheduling problems stemming from the increased UTE rate, while at the

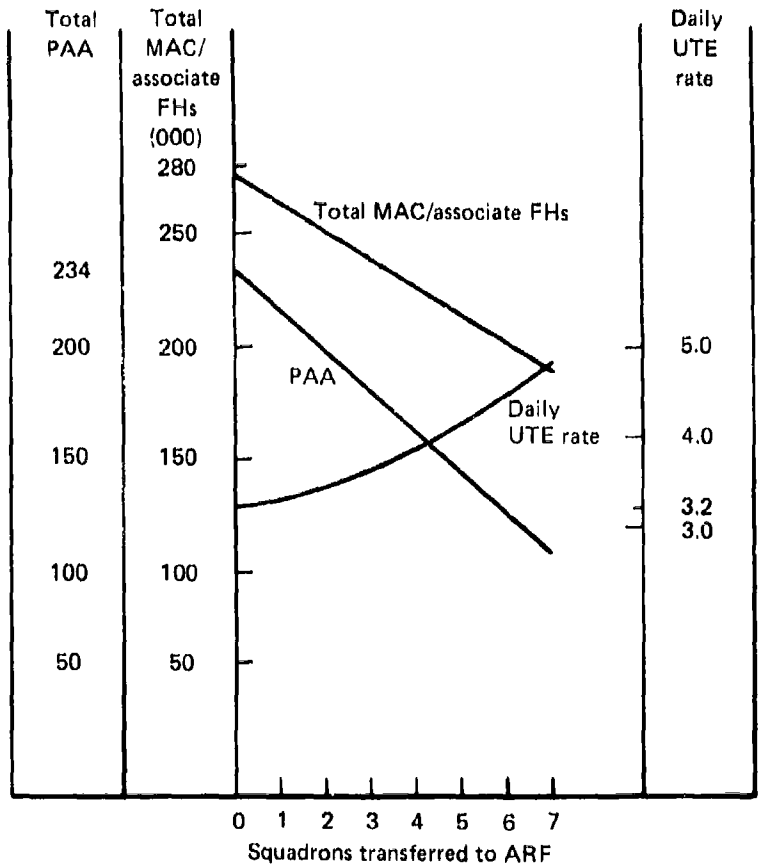

Fig. 2 — Effect of C-141 transfers to ARF on the daily UTE rate of the remaining MAC aircraft

might be necessary to shift some of the copilot experiencing to the C-5 force, although the larger aircraft has a total factor for flying hour costs that is 2-1/2 times that of the C-141 (Ref. 5).

Increased Flying Hours for Remaining MAC Crews

Table 16 indicates the increase in annual flying hours per MAC active duty aircrew that is implied by each C-141 transfer to the ARF because of the large, fixed number of experiencing copilots and a diminishing base of C-141 aircraft. The Marginal, Remainder, and Total flying hour figures were copied from Table 15. Subtracting the local training that is unavailable for copilot experiencing (estimated in Table 13 at 478.5 flying hours per marginal MAC squadron) plus the 7,150 flying hours total for the other "fixed" local training yields the total flying hours required for copilot experiencing for the remaining MAC force. Figure 3 translates the figures in Table 16 into graphic form.

The increase in required flying hours per aircrew (which already is high compared with the requirements of other Air Force aircraft types) suggests that a transfer of more than a few C-141 squadrons to the ARF might have an undesirable effect on the retention of MAC C-141 pilots if it translates into more of the longer, undesirable missions. Again, beyond some point, shifting some of the copilot experiencing responsibility to the higher cost C-5 force may be necessary.

CURRENT DISTRIBUTION OF C-141 PEACETIME ANNUAL FLYING HOURS

Table 17 shows the current distribution of the peacetime flying missions of the C-141 fleet. These are the missions that are accomplished during the training flights of C-141 crews, the distribution between the active MAC and Associate squadrons being shown both in terms of flying hours and as a percent of the total for each mission. The "proficiency training" flying hours are for the specialized training events that must be practiced regularly by the C-141 aircrews. These flying hours vary directly with the number of

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same time reducing the space requirements of the ARF squadrons. The tight scheduling of reservist flying implied by this proposal may not be compatible with ARF operational realities; however, ARF C-130 squadrons have operated with as few as six aircraft.

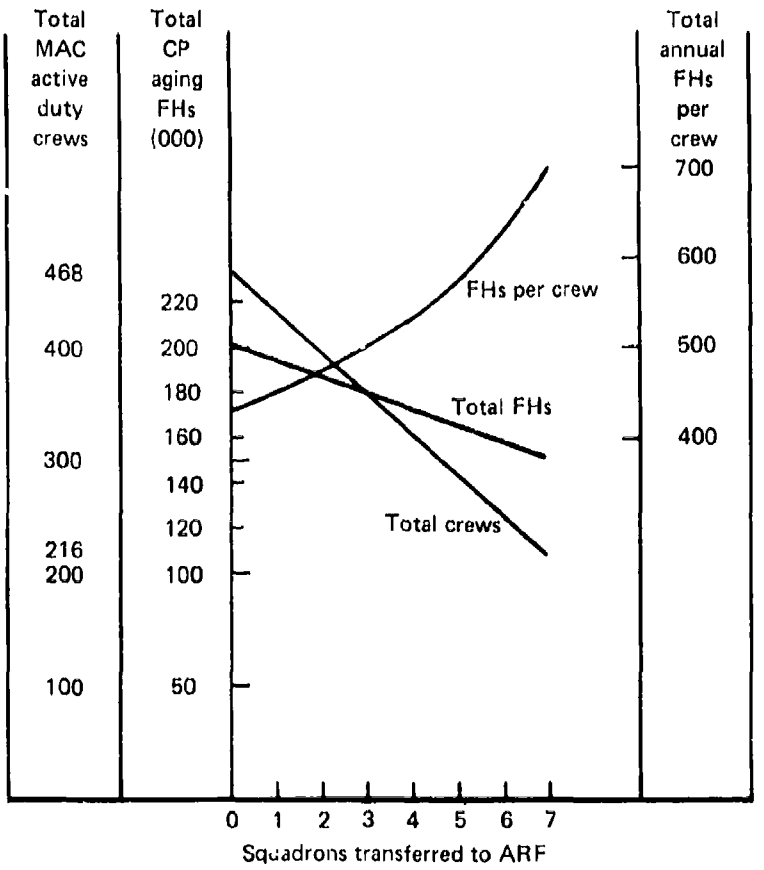

Fig. 3 — Effect of C-141 transfers to ARF on the annual flying hours per remaining MAC active duty aircrew

Table 16

EFFECT OF C-141 TRANSFERS TO ARF ON THE REMAINING MAC/ASSOCIATE FORCE'S FLYING HOURS PER ACTIVE DUTY CREWS

Sqdns Transferred	Tot Sqs	PAA	MAC Active Crews (CR=2)	Remaining MAC/Associate C-141 Force: MAC Active Duty Aircrew Annual Flying Hours: Marginal	Remainder	Total	Other Local	Copilot Aging: Total	Copilot Aging: Each
0	13	234	468	99,840	114,660	214,500	-13,371	201,130	430
1	12	216	432	92,160	114,660	206,820	-12,892	193,928	449
2	11	198	396	84,480	114,660	199,140	-12,414	186,727	472
3	10	180	360	76,800	114,660	191,460	-11,935	179,525	499
4	9	162	324	69,120	114,660	183,780	-11,457	172,324	532
5	8	144	288	61,440	114,660	176,100	-10,978	165,122	573
6	7	126	252	53,760	114,660	168,420	-10,500	157,921	627
7	6	108	216	46,080	114,660	160,740	-10,021	150,719	698

crews to be trained. The "airlift services" category covers the flying hours that are used for transporting cargo and passengers in peacetime. MAC is "reimbursed" by its customers in the armed forces and other government agencies for this service. The demand for this airlift is unaffected by MAC aircrew availability. It is clear from Table 17 that the active duty crews provide the bulk of this useful peacetime airlift. (The active crews also are relied upon for most of the longer missions that service our distant outposts.)

Table 17

CURRENT DISTRIBUTION OF C-141 ANNUAL FLYING HOURS

Mission	Total[a] FHs	Total[a] Pct	MAC Sqdns[b] FHs	MAC Sqdns[b] Pct	Assoc Sqdns[b] FHs	Assoc Sqdns[b] Pct
Proficiency Training						
Local trng	50,370	100	28,660	57	21,710	43
Jt. Abn/Air Transport Trng	15,000	100	10,950	73	4,050	27
Total proficiency	65,370	100	39,610	61	25,760	39
Airlift Services						
Nonchannel						
Test/ferry	1,350	100	1,350	100	0	0
Exercise	43,000	100	41,495	96	1,505	4
Special Assignment Airlift Mission	36,000	100	32,760	91	3,240	9
Total nonchannel	80,350	100	75,605	94	4,745	6
Channel[c]	129,230	100	99,285	77	29,945	23
Tot airlift	209,580	100	174,890	83	34,690	17
Grand total	274,950	100	214,500	78	60,450	22

[a]MAC HQ (DOOAC) projections.

[b]Split between MAC and Associate squadrons based on FY83 distribution.

[c]MAC and Associate channel estimates are the residuals after subtracting the other missions from the projected C-141 flying hour totals of each command.

MAC spokesmen regularly state that these flights are needed to train their aircrews and other personnel and the fact that its aircraft perform a useful service in peacetime is a bonus (Ref. 9). Nevertheless, there is no question that these MAC flights save transportation expense that would otherwise be going to commercial carriers. MAC was programmed to carry approximately 89 percent of the government-generated cargo ton miles and 13 percent of the passenger miles in FY84 (Ref. 10). If MAC's "revenue" flights are reduced, the bill for the commercial airlift augmentation will rise.

At this time, it has not been reported the extent to which the Independent ARF C-141 units will engage in the peacetime business of transporting passengers and cargo, which now accounts for a little more than half of the flying time of the Associate aircrews. But even if they devote as many flying hours per crew to the service missions as the Associate crews do now, there would be a considerable reduction in the available flying hours for these activities with each succeeding transfer of C-141s from the MAC/Associate squadrons to the ARF because of the loss of the active duty contribution.

EFFECT OF C-141 TRANSFERS TO ARF ON FLYING HOURS DEVOTED TO CHANNEL TRAFFIC

Table 18 shows the dramatic decline in the C-141 channel traffic flying hours if the Independent ARF C-141 squadrons limit their flights to minimum proficiency training. The total airlift flying hours from the previous table are compared with the available hours of the remaining MAC/Associate fleet.[2]

Of the peacetime service missions performed by the C-141 fleet, shown in Table 17, the channel traffic would seem to have the lowest priority: It provides the most repetitive of the military training missions of the MAC aircrews; and, in any event, it is the only service that can be readily adopted by the commercial carriers. If it is assumed that the flying hours devoted to the other global activities and local training would have first call on the available flying hours of

[2]These figures assume an increased flying rate on the part of the remaining active duty C-141 crews, as explained in the previous sections. If this did not occur the deficit would be even greater.

Table 18

EFFECT OF C-141 TRANSFERS TO ARF ON THE NUMBER OF ANNUAL FLYING HOURS AVAILABLE FOR CHANNEL TRAFFIC, NO CHANNEL TRAFFIC ON INDEPENDENT ARF FLIGHTS

Sqdns Transferred	Remaining MAC/Associate Force		Proficiency Flying Hours	Airlift FH Distribution			Channel Deficit	
	Total Sqdns	Total FHs		Total	Non-Channel	Channel Traffic	Flying Hours	Pct
Baseline	13	274,950	65,370	209,580	80,350	129,230	--	--
1	12	262,620	61,970	200,650	80,350	120,300	-8,930	-7
2	11	250,290	58,570	191,720	80,350	111,370	-17,860	-14
3	10	237,960	55,170	182,790	80,350	102,440	-26,790	-21
4	9	225,630	51,770	173,860	80,350	93,510	-35,720	-28
5	8	213,300	48,370	164,930	80,350	84,580	-44,650	-35
6	7	200,970	44,970	156,000	80,350	75,650	-53,580	-41
7	6	188,640	41,570	147,070	80,350	66,720	-62,510	-48

the remaining MAC/Associate C-141 fleet, Table 18 reveals the effect on channel flying of each subsequent transfer of C-141 assets from MAC/Associate operation to the Independent ARF.

Table 19 presents a similar analysis but with the assumption that the Independent ARF C-141 squadrons will contribute to the revenue-producing peacetime airlift missions a share of their flying hours that is proportional to the present reserve Associate contribution. Because the Independent ARF squadrons are assumed to have crew ratios of 4.0 rather than the Associate squadrons' crew ratio of 2.0, the Independent ARF C-141 squadrons are assumed to fly twice as many hours (5,337 per

ARF C-141 squadrons are assumed to fly twice as many hours (5,337 per squadron) in support of the revenue missions as their Associate counterparts.

The resultant channel traffic deficits are portrayed in graphic form in Fig. 4. The potential deficits are considerable and they grow cumulatively worse with each additional transfer. Because the travel and shipments they represent are considered necessary to the operation of the military forces, these airlift deficits will have to be overcome, and doing so will have some adverse budget consequences.

Assessment of the cost of overcoming the channel flying hour deficit is anything but straightforward. The easiest to comprehend (because it confines the analysis to the same aircraft model) is for the gaining ARF squadrons to restore the lost flying hours with an increase in their planned flying hour program. With this scenario, the sum of the aircraft factors that vary with flying hours ($2,683)[3] times the mission deficit noted in Table 19 (3,593 flying hours per transferred C-141 squadron) would increase the operating cost of the ARF squadrons by $9.6 million a year. To this must be added the cost of the additional maintenance Technicians needed to support the increased peacetime flying program. Given the maintenance manhour estimating equation shown above (p. 8) and an annual cost per Technician of $30,100, the flying hour increase raises total Technician costs by $3.9 million, for a total increase of $13.5 million in overall annual O&S costs. It is not certain that additional aircrew mandays would not be needed to produce the additional flights, but, ignoring that possibility, if this approach would be acceptable to the ARF it would reduce the annual cost differential for the ARF 18-PAA squadron to only 10 percent less than the MAC/Associate squadron. The two 9-PAA ARF squadrons actually would cost slightly more than the present arrangement.

When we depart from the C-141 alternatives, the tradeoffs become less distinct. For example, the C-5 costs 2-1/2 times as much to operate as the C-141. However, the C-5 has a much greater capacity, so its potential cost per ton mile is better than that of the C-141.[4]

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[3]Table 8.

[4]The author is indebted to Mr. R. Sugg (MAC/ACI) for much of the airlift cost information in this section.

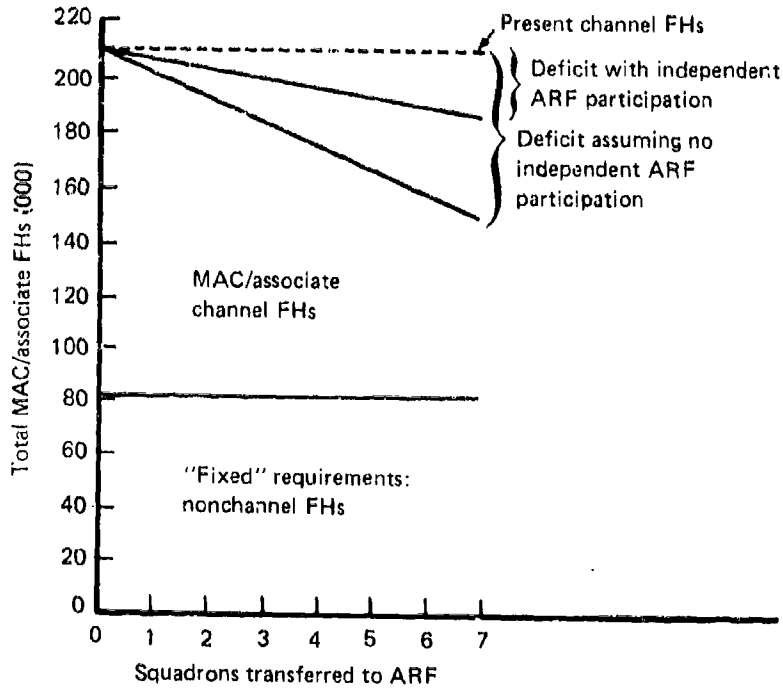

Fig. 4 – Effect of C-141 transfers to ARF on channel traffic flying hours

Table 19

EFFECT OF C-141 TRANSFERS TO ARF ON THE NUMBER OF ANNUAL FLYING HOURS AVAILABLE FOR CHANNEL TRAFFIC, CHANNEL TRAFFIC ON INDEPENDENT ARF FLIGHTS

Sqdns transferred	Avail FHs for Airlift			Distribution		Channel Deficit	
	MAC/ Assoc	Independ[a] ARF	Total	Non-Channel	Channel Traffic	Flying Hours	Pct
Baseline	209,580	0	209,580	80,350	129,230	--	--
1	200,650	5,337	205,987	80,350	125,637	-3,593	-3
2	191,720	10,674	202,394	80,350	122,044	-7,186	-6
3	182,790	16,011	198,801	80,350	118,451	-10,779	-8
4	173,860	21,348	195,208	80,350	114,858	-14,372	-11
5	164,930	26,685	191,615	80,350	111,265	-17,965	-14
6	156,000	32,022	188,022	80,350	107,672	-21,558	-17
7	147,070	37,359	184,429	80,350	104,079	-25,151	-19

[a]Assumes twice as many flying hours available for the fixed missions as a comparable number of Associate squadrons can produce because the Independent ARF squadrons have twice as many reservist line crews: 72 rather than 36.

Unfortunately, the frequency of MAC's peacetime flights is determined by training needs and by the needs of its customers rather than by cabin load efficiency. For people, spare parts, and supplies to arrive at their destinations in a timely manner MAC C-141s often fly with less than full loads. If the C-141s have this problem, the C-5s will probably be underutilized even more. Therefore, the cost of substituting C-5s for the C-141s will, on average, tend to exceed the cost of shipping by means of the smaller C-141s, although it is difficult to be precise about the dollar amount with the data that are available for this comparison.

The commercial carriers under contract to MAC are equipped with 747s for the most part, although there still are some DC-8s in the inventory. The large cargo aircraft would experience the same space problems as the C-5s, and the design of the DC-8 is such that little more than half of the cargo space can be utilized for other than the smaller bulk items. Moreover, the use of commercial air carriers is further confused by the rate structure. The current rate is $0.3209 per ton mile (of full capacity) if the aircraft can be utilized in both directions. For a one-way delivery the rate increases to $0.5624 per ton mile.

MAC airlift planners have projected commercial airlift augmentation for channel cargo deliveries based on past experience of the cost and the percentage of cargo space utilized for inbound and outbound traffic. The equation--$58.866 million for 111.800 million ton miles--yields an average of $0.53 per ton mile. Other channel planning factors (Ref. 10) indicate that, on the average, the C-141 flew with an authorized cabin load of 23.4 tons (2/3 full) in FY84 at a block speed of 380, or a total per flying hour of 8,892 ton miles. If this average applies at the margin, the 3,593 flying hour channel deficit per C-141 squadron transferred to the ARF is equivalent to about 31.9 million ton miles a year. At $0.53 per ton mile it would cost $16.9 million in additional out-of-pocket transportation costs to overcome this deficit with commercial air carriers. This amount credits the 747s with an average cabin load of 89 percent of capacity, or about 80 tons. If the channel schedule of the C-141 replacement flights would require the commercial carriers to fly at considerably lower capacity levels, the additional cost could rise to even higher amounts. Although it is not possible with the data at hand to calculate precisely what the additional transportation outlays would be to substitute C-5 aircraft or commercial air for the present C-141 channel flights, it obviously could be substantial enough to offset most, if not all, of the direct savings of C-141 transfers to the ARF.

A detailed examination of the incremental costs of each additional transfer of C-141 assets to the ARF is beyond the scope of this study. However, the figures in Tables 15 through 19 probably are adequate to

suggest that, given present manning and training policies and peacetime airlift requirements, the transfer of each successive squadron of C-141s to the ARF will result in annual operating cost savings that are less than those shown in Table 14, unless the transfers coincide with the procurement of a new strategic airlift aircraft that can take on the missions currently assigned to the C-141 fleet at comparable cost. This is an important point. The USAFR refers to the above issues as "near term" problems, until the C-17 is operational.

On the other side of the coin it might be argued that because of the present ARF policy of retaining more flying units in the force than can be fully equipped with recent vintage aircraft, there are opportunities for additional, indirect savings beyond those tabulated above in Table 14. From a total force standpoint, if a transfer of C-141 aircraft to the ARF is accompanied by a phaseout of an equivalent number of obsolescent aircraft, then the incremental cost to the ARF is only the difference between the expenditures needed previously to operate the obsolescent aircraft and the cost of operating the newer C-141s. Considering the military capability side of the tradeoff equation, the total force would lose the effectiveness of those obsolescent aircraft. However, because of the advanced age of some of the ARF's early-model aircraft that might be replaced by the C-141s, the loss might not be very important.

For another example, if the C-141s displace aircraft that have not yet reached the end of their useful lives, these displaced aircraft may be used to augment ("robust") other flying units of the same type to a more economical size (at locations where the local population can support a larger unit). For instance, the most common PAA aircraft strength for ARF C-130 squadrons is eight aircraft. If C-141s were to displace an 8-PAA squadron of C-130s, and these C-130s were to be combined with another 8-PAA C-130 squadron, they could be operated more economically because of savings in overhead and for other economies of scale. In this case, the ARF would not save the entire cost of the displaced C-130 unit; however, these eight C-130s would be operated at almost 30 percent less cost than before (Ref. 11).

There is some question about the legitimacy of adding such savings to the other, direct, savings in the MAC/Associate versus Independent ARF cost comparisons--after all, these additional "savings" could be achieved without the transfer of C-141s.[5] From a more pragmatic point of view, however, it should be recognized that over the years the ARF has maintained the same number of flying units regardless of how well it has been able to equip them. It makes economic sense to enhance the value of this repository of skills by providing them with modern equipment, and this is a consideration that should not be ignored in individual total force mix tradeoff decisions. However, because the actual budgetary effect of such secondary force restructuring effects depend upon the circumstances surrounding individual squadron transfers, they are beyond the scope of this general study.

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[5]The "transition" squadron issue is addressed at length in Ref. 11, Sec. VI.

V. C-141 FORCE EFFECTIVENESS ISSUES

This Note has focused on the cost side of the cost/effectiveness tradeoff equation. It has identified the primary cost drivers of C-141 airlift units and the considerations that bear on the magnitude of the savings to be expected from transferring some of these units to independent operation by the ARF. What about the relative effectiveness of the MAC/Associate units and the ARF units? Judging by the reservist members of the present MAC/Associate units, there is little question that the wartime capability of reserve airlift units, once they have been mobilized and the airlift operation has been established, would be indistinguishable from that of the active duty units. This is understandable: Most of the reserve airlift pilots are former Air Force airlift crew members, and a large proportion of them work for airlines full time. Their total flying hour experience often exceeds that of active duty crews, which are composed, to a great extent, of new copilots gaining experience in the cockpit. Reserve aircraft maintenance Technicians are generally acknowledged to be of superior quality. A question mark is the presence of large numbers of non-prior service reservists whose experiencing is limited to little more than one weekend a month.

Where reserve airlift units definitely tend to fall behind the active duty units is in the level of peacetime operations. Obviously, a reservist with a full-time job elsewhere has practical limitations on the amount of time he is willing to devote to the reserve activity. In C-141 flying units, the Associate aircrews fly only 22 percent as much as their active duty counterparts. Thus, peacetime airlift services provided by the present MAC/Associate C-141 fleet cannot be supported to the same degree by reservists: The crews do not have the time nor do they need as much training. Nevertheless, to the extent that these airlift services are vital to the operation of the armed forces, they must be provided--if not by MAC C-141s, then by higher-cost C-5s or by commercial carriers. The latter would have to be financed by additional out-of-pocket travel and transportation expense rather than being a (cost-free) "byproduct of the required training program" (Ref. 9).

Finally, there is concern that the already inadequate airlift force could be further compromised during the transition time needed for the ARF squadrons to convert to their newly assigned C-141s.

It has been pointed out that C-5s cost so much to operate that C-141s are used to help experience their copilots and reduce the C-5 flying time. As a result, the difference between the C-5 peacetime and wartime planned flying rates is much greater than the difference noted earlier for the C-141 fleet. Yet the reserve Associate share of the total maintenance manning actually is less in the C-5 fleet than it is in the C-141 fleet, where the high peacetime flying rate inhibits the full exploitation of the reserve force's low-cost surge capability. This may be because C-5s are concentrated in a few metropolitan areas where the potential reservist pool is inadequate.

Transferring C-5s to the ARF might be a cost-effective alternative to the transfer of C-141s if it is feasible to operate the mammoth C-5s at available reserve unit locations. The full complement of C-5s might not have to be deployed to an ARF airfield to fulfill the squadron's training requirements. If a portion of the ARF squadron's PAA could be deployed on a MAC C-5 base it would reduce the ramp space requirements on the ARF airfield. Flight scheduling might create a problem, but, as was noted earlier, some C-130 squadrons have operated with as few as six aircraft.

It is to be hoped that these alternatives and concerns, when viewed in conjunction with the reduced prospect of large savings, will encourage a careful reappraisal of the current impetus to shift a greater share of MAC's C-141 strategic airlift assets to the ARF until a replacement aircraft is acquired that can perform the peacetime missions of the C-141 force at comparable cost.

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